Western Electricity Coordinating Council

Western Interconnection Synchrophasor Program

Abstract

The Western Electricity Coordinating Council (WECC) and eight of its member transmission owners are deploying synchrophasor devices throughout the United States portion of the Western Interconnection. The project aims to improve electric system reliability and restoration procedures and prevent the spread of local outages to neighboring regions. The project also could improve the grid integration of renewable resources. Phasor measurement units (PMU), phasor data concentrators (PDC), communication systems, information technology infrastructure, and advanced transmission software applications are being deployed in the project. These systems increase grid operators' visibility of bulk power system conditions in near real-time, enable earlier detection of problems that threaten grid stability or cause outages, and facilitate sharing of information with neighboring control areas. Having access to better system operating information allows WECC staff to improve power system models and analysis tools, thus improving the reliability and operating efficiency of the bulk power system.

Smart Grid Features

The Western Interconnection Synchrophasor Program (WISP) uses advanced **wide-area monitoring, visualization, and control** systems not previously available to transmission owners in the Western Interconnection. These systems provide a more expansive view of the Western bulk power system and simultaneously reveal dynamic operating conditions.

Communications infrastructure includes the design and implementation of a new high-availability, wide-area network that supports phasor data exchange between the transmission owners and the aggregation of data for the WECC Reliability Coordination Offices. This includes upgrading and deploying a new network infrastructure at the transmission owner level to connect an estimated 250—300 PMUs throughout the U.S. portion of the Western Interconnection.

At-A-Glance

Recipient: Western Electricity Coordinating Council

State: AZ, CA, CO, ID, MT, NM, NV, OR, SD, TX, and WA

NERC Region: Western Electricity Coordinating Council

Total Budget: $107,780,000

Federal Share: $53,890,000

Key Partners: Bonneville Power Administration, California ISO/California Energy Commission, Idaho Power Corporation, NV Energy, PacifiCorp, Pacific Gas & Electric, Southern California Edison, and Salt River Project

Project Type: Electric Transmission Systems

Equipment

- 250 PMUs–300 PMUs
- 20 PDCs
- Transmission Systems Communication Equipment

Advanced Applications

- Angle and Frequency Monitoring
- Voltage and Voltage Stability Monitoring
- Post-Mortem Analysis
- Oscillation Energy and Mode Meter Monitoring
- Reactive Reserves Monitoring and Device Control
- Model Baselining, Validation, and Improvement
- Path Loading and Congestion Management

Targeted Benefits

- Deferred Investment in Transmission Capacity Expansions
- Reduced Ancillary Service Cost
- Reduced Wide-Scale Blackouts
- Increased Electric Service Reliability
- Improved Utilization of Intermittent Renewable Generation

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Advanced transmission applications for the synchrophasor system include:

- **Angle and frequency monitoring** provides grid operators and engineers with detailed information about grid conditions and power flows.
- **Post-mortem analysis** enables power system engineers and grid operators to analyze disturbances and large-scale system events, to better understand their causes and to improve future system models and operations.
- **Voltage and voltage stability monitoring** provides grid operators and engineers with detailed information about grid conditions and system stability.
- **Oscillation energy and mode meter monitoring** allows grid operators and engineers to observe power system disturbances and oscillations and to assess their impacts on grid reliability.
- **Reactive reserves monitoring and device control** enables grid operators to better manage reactive power flows and to ensure greater voltage control and stability.
- **Model baselining, validation, and improvement** increase the accuracy of power systems models for planning and operations.
- **Path loading and congestion management** techniques provide grid operators with more tools for identifying disturbances and preventing them from cascading into more serious problems or outages.

Timeline

Key Milestones	Target Dates
WECC infrastructure deployment begins	Q1 2010
Phasor measurement unit/phasor data concentrator deployment begins	Q1 2011
Advanced application deployment completed	Q4 2012
Phasor measurement unit system deployment completed	Q1 2013

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